



Wave intensification by currents

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Rogue waves have received considerable scientific attention in recent years. They are commonly defined as waves with height $H \geq 2.2H_s$, where H_s is the significant wave height (typically estimated from records that are several tens of minutes long).

Wave buoy records off Canada's west coast reveal strong spatial and temporal variability in the occurrence rate of rogue waves, with differences up to a factor three over distances less than 100 km. On the continental shelf, strong tidal currents interact with the wave field, whereas in the open ocean the wave field might be affected by wind induced currents. There is evidence that the rogue wave occurrence rate is correlated with the tidal phase. Average rogue waves occurrence rates vary by up to a factor 2 at different tidal phases. Furthermore, the significant wave height, characterizing the background wave field, is also strongly affected by currents. Modulations of up to 2m within one tidal cycle are observed. In coastal locations the wave field is modulated at the tidal semi-diurnal period, in deep water modulations occur at the inertial period. Interestingly, wave amplification not only occurs in opposing currents but also when wave propagation and currents are nearly aligned.